

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

Wolfgang KEHRER et al

Based on PCT/DE 01/01421

For: Electric Motor

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Prior to examination, please amend the above-identified application as follows:

IN THE SPECIFICATION

Page 1, between the title and paragraph [0001] insert:

[0000.2] CROSS-REFERENCE TO RELATED APPLICATIONS

[0000.4] This application is a 35 USC 371 application of PCT/DE 01/01421 filed
on April 11, 2001.

[0000.6] BACKGROUND OF THE INVENTION

replace paragraph [0001] with the following amended paragraph:

[0001] Field of the Invention

replace paragraph [0002] with the following amended paragraph:

[0002] The invention is based on an electric motor, especially for driving a
blower in air conditioners of the type commonly used in motor vehicles.

after paragraph [0002], insert the following new paragraph:

[0002.5] **Brief Description of the Prior Art**

replace paragraph [0003] with the following amended paragraph:

[0003] In electric motor of the type with which this invention is concerned, 12th- and 24th-order slot-frequency noises occur, which if the electric motor is for instance used as a blower motor in an air conditioner are emitted as airborne and structure-borne sound past the blower housing and cause quite irritating noise in the passenger compartment. Measures are therefore taken to reduce these noises extensively.

Page 2, replace paragraph [0006] with the following paragraph:

[0006] **SUMMARY OF THE INVENTION**

replace paragraph [0007] with the following amended paragraph:

[0007] The electric motor of the invention has the advantage that noise reduction occurs along with a structurally simple, sturdy design of the motor. Bearing hoops for the rotor bearings, which are complicated to produce and difficult to install, are dispensed with. The rotor bearings are instead secured rigidly to the housing by their bearing sleeves and can easily be jointly injection-molded in the process of producing the housing by injection molding. The rotor bearings, preferably embodied as slide bearings, cannot transmit tangential forces of the rotor, and they are thus decoupled from the stator. Because of the spring-elastic fastening of the stator to the housing, there is no rigid connection between the stator and the housing, which prevents the transmission of structure-borne sound from the stator to the housing.

delete paragraph [0008]

Page 3, replace paragraph [0011] with the following amended paragraph:

[0011] BRIEF DESCRIPTION OF THE DRAWINGS

replace paragraph [0012] with the following amended paragraph:

[0012] The invention is explained in further detail in the ensuing description with reference to the drawings, in which:

replace paragraph [0013] with the following amended paragraph:

[0013] Fig. 1 is a longitudinal section through an electric motor;

replace paragraph [0014] with the following amended paragraph:

[0014] Fig. 2 is a side view of an electric motor, somewhat modified from Fig. 1, without a housing;

replace paragraph [0015] with the amended paragraph:

[0015] Fig. 3 is a detail of a section taken along the line III-III in Fig. 2; and

Page 4, replace paragraph [0016] with the following amended paragraph:

[0016] Fig. 4 is a detail showing a plan view in the direction of the arrow IV Fig. 2.

replace paragraph [0017] with the following amended paragraph:

[0017] DESCRIPTION OF THE PREFERRED EMBODIMENTS

Page 5, replace paragraph [0020] with the following amended paragraph:

[0020] The rotor bearings 14, 15 for receiving the rotor shaft 13 are fixed to the housing; the rotor bearing 14 is integrated with the bottom 23 of the housing pot

21, and the rotor bearing 15 is integrated with the housing cap 22. The housing pot 21 and housing cap 22 are for instance of plastic and for instance are injection-molded, and the rotor bearings 14, 15 are for instance jointly injection-molded simultaneously in the injection molding process. For decoupling structure-borne sound emission from the stator 11 to the housing 10, the stator 11 is suspended from the housing pot 21 spring-elastically. To that end, decoupling elements 28 spaced apart from one another in the circumferential direction are secured to the inner wall 211 of the housing pot 21, and the stator 11 is retained by nonpositive and/or positive engagement on these elements. The stator 11, which comprises a pole tube 30 equipped with permanent magnet poles 29, is braced with its pole tube 30 indirectly, for instance, on the decoupling elements 28. In the exemplary embodiment of Fig. 1, four decoupling elements 28 are provided, offset from one another by 90° of an angle of rotation each, so that in the sectional view, two of these decoupling elements 28 can be seen. The decoupling elements 28 extend for instance over the entire axial length of the pole tube 30 and protrude somewhat from the face end.

Page 6, replace paragraph [0022] with the following amended paragraph:

[0022] As best seen from the sectional view of Fig. 3, each decoupling element 28 has a generally C-shaped profile, with one longitudinal rib 281 that is injection-molded onto the inner wall 211 of the housing pot 21 (Fig. 4), with a short leg 282 protruding at right angles from the longitudinal rib 281 toward the rotor shaft 13, and with a long leg 283 protruding at right angles from the longitudinal rib 281 toward the rotor shaft. In the long leg 283, from the inside of the leg oriented toward

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the short leg 282, a curved or annular- segment slot 31 is made, which extends over the full width, in the circumferential direction, of the long leg 283. This slot 31 is embodied such that the pole tube 30 can be inserted by a portion of one face end 301 into the slot 31 by positive engagement. On the free end, toward the pole tube 30, of the short leg 282, a positive-engagement element is for instance embodied, which cooperates with a positive- engagement element embodied on the outer jacket of the pole tube 30, near the other face end 302 thereof. In the exemplary embodiment of Figs. 2-4, the two positive- engagement elements are formed by the groove 33 and tongue 32 of a dovetail connection 34; the tongue 32 - as seen in Fig. 4 - is disposed on the short leg 282 of the decoupling element 28, and the groove 33 is disposed on the pole tube 30. The groove 33 of the dovetail connection 34, machined into the pole tube 30, is open toward the face end 302 of the pole tube 30, so that the tongue 32 can be pressed axially into the groove 33 on the elastic decoupling element 28.

Page 9, after paragraph [0025], insert the following new paragraph:

[0026] The foregoing relates to preferred exemplary embodiment of the invention, it being understood that other variants and embodiments thereof are possible within the spirit and scope of the invention, the latter being defined by the appended claims.

Page 10, delete "Claims" and insert --We Claim--.

IN THE CLAIMS

Please cancel claims 1-9 and add new claims 10-29.

10. In an electric motor, having a stator (11), a rotor (12) that is rotatable in the stator (11), a rotor shaft (13) received rotatably in rotor bearings (14, 15), and decoupling means for reducing the emission of airborne and structure-borne sound between the stator (11) and the rotor bearings (14, 15), the improvement wherein said rotor bearings (14, 15) are fixed on a housing (10) that surrounds and grips the stator (11), said decoupling being achieved by means of a spring-elastic suspension of the stator (11) from the housing (10).

11. The electric motor of claim 10, wherein said spring-elastic suspension of the stator (11) from the housing (10) comprises decoupling elements (28), at which the stator (11) is retained by nonpositive and/or positive engagement are secured to the inner wall (211) of a housing pot (21), spaced apart from one another in the circumferential direction.

12. The electric motor of claim 11, comprising at least three decoupling elements (48), offset from one another by the same angle of rotation, each extending over the entire axial length of the stator (11).

13. The electric motor of claim 11, wherein said decoupling elements (28) comprise an elastomer and, preferably by the two-component process, are jointly injection-molded onto the plastic injection-molded housing (21).

14. The electric motor of claim 12, wherein said decoupling elements (28) comprise an elastomer and, preferably by the two-component process, are jointly injection-molded onto the plastic injection-molded housing (21).

15. The electric motor of claim 11, wherein said decoupling elements (28) have a C-shaped profile and protrude radially to the rotor shaft (13) away from the housing pot (21) with both legs (282, 283) of the C, which are joined together by a longitudinal rib (281), and wherein means for coupling the stator (11) by positive engagement are formed in each of the legs (282, 283) of the C.

16. The electric motor of claim 13, wherein said decoupling elements (28) have a C-shaped profile and protrude radially to the rotor shaft (13) away from the housing pot (21) with both legs (282, 283) of the C, which are joined together by a longitudinal rib (281), and wherein means for coupling the stator (11) by positive engagement are formed in each of the legs (282, 283) of the C.

17. The electric motor of claim 15, wherein said stator (11) has a pole tube (30) equipped with permanent magnet poles (29), wherein on one leg (283) of the C of the decoupling elements (28), an annular-segment slot (31) is provided for positive-engagement insertion of one face end (301) of the pole tube (30), and wherein on the other leg (282) of the C of the decoupling elements (28), a positive-engagement element cooperating with a positive-engagement element embodied on or in the jacket of the pole tube (30) is provided.

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18. The electric motor of claim 16, wherein said stator (11) has a pole tube (30) equipped with permanent magnet poles (29), wherein on one leg (283) of the C of the decoupling elements (28), an annular-segment slot (31) is provided for positive-engagement insertion of one face end (301) of the pole tube (30), and wherein on the other leg (282) of the C of the decoupling elements (28), a positive- engagement element cooperating with a positive-engagement element embodied on or in the jacket of the pole tube (30) is provided.

19. The electric motor of claim 17, wherein the two positive-engagement elements form a tongue (32) and groove (33) of a dovetail connection (34).

20. The electric motor of claim 19, wherein the groove (33) of the dovetail connection (34) is machined into the jacket of the pole tube (30), and the tongue (32) of the dovetail connection (34) protrudes from the free end face, oriented toward the pole tube (30), of the leg (282) of the C of the decoupling elements (28).

21. The electric motor of claim 11, wherein the housing pot (21) is closable with a housing cap (22) that carries a fastening flange (26), and that the rotor bearings (14, 15) are disposed in the pot bottom (23) of the housing pot (21) and in the housing cap (22), respectively.

22. The electric motor of claim 12, wherein the housing pot (21) is closable with a housing cap (22) that carries a fastening flange (26), and that the rotor bearings (14,

15) are disposed in the pot bottom (23) of the housing pot (21) and in the housing cap (22), respectively.

23. The electric motor of claim 13, wherein the housing pot (21) is closable with a housing cap (22) that carries a fastening flange (26), and that the rotor bearings (14, 15) are disposed in the pot bottom (23) of the housing pot (21) and in the housing cap (22), respectively.

24. The electric motor of claim 14, wherein the housing pot (21) is closable with a housing cap (22) that carries a fastening flange (26), and that the rotor bearings (14, 15) are disposed in the pot bottom (23) of the housing pot (21) and in the housing cap (22), respectively.

25. The electric motor of claim 15, wherein the housing pot (21) is closable with a housing cap (22) that carries a fastening flange (26), and that the rotor bearings (14, 15) are disposed in the pot bottom (23) of the housing pot (21) and in the housing cap (22), respectively.

26. The electric motor of claim 16, wherein the housing pot (21) is closable with a housing cap (22) that carries a fastening flange (26), and that the rotor bearings (14, 15) are disposed in the pot bottom (23) of the housing pot (21) and in the housing cap (22), respectively.

27. The electric motor of claim 17, wherein the housing pot (21) is closable with a housing cap (22) that carries a fastening flange (26), and that the rotor bearings (14, 15) are disposed in the pot bottom (23) of the housing pot (21) and in the housing cap (22), respectively.

28. The electric motor of claim 18, wherein the housing pot (21) is closable with a housing cap (22) that carries a fastening flange (26), and that the rotor bearings (14, 15) are disposed in the pot bottom (23) of the housing pot (21) and in the housing cap (22), respectively.

29. The electric motor of claim 19, wherein the housing pot (21) is closable with a housing cap (22) that carries a fastening flange (26), and that the rotor bearings (14, 15) are disposed in the pot bottom (23) of the housing pot (21) and in the housing cap (22), respectively.

IN THE ABSTRACT

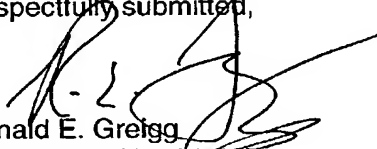
Please substitute the attached Abstract of the Disclosure for the abstract as originally as filed.

REMARKS

The above amendments are being made to place the application in better condition for examination.

Entry of the amendment is respectfully solicited.

Respectfully submitted,


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Page 13, replace abstract for the following amended abstract:

Abstract of the Disclosure

In an electric motor with a stator and a rotor that is received rotatably via its rotor shaft in rotor bearings, and having an effective decoupling between the stator and rotor bearings for reducing the emission of airborne and structure-borne sound, in order to attain a structurally simple, sturdy design with markedly little motor noise, the rotor bearings are fixed on a housing surrounding and gripping the stator, while the decoupling is achieved by a spring-elastic suspension of the stator from the housing, and to that end elastic decoupling elements are disposed between the stator and the housing.

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

Page 1, paragraphs [0001], [0002], and [0003]:

[0001] [Prior Art] Field of the Invention

[0002] The invention is based on an electric motor, especially for driving a blower in air conditioners[, is generically defined by the preamble to claim 1.] of the type commonly used in motor vehicles.

[0003] In [such] electric motors of the type with which this invention is concerned, 12th- and 24th-order slot- frequency noises occur, which if the electric motor is for instance used as a blower motor in an air conditioner are emitted as airborne and structure-borne sound past the blower housing and cause quite irritating noises in the passenger compartment. Measures are therefore taken to reduce these noises extensively.

Page 2, paragraphs [0006], [0007], and [0008]:

[0006] [Advantages of the Invention] SUMMARY OF THE INVENTION

[0007] The electric motor of the invention has the advantage that noise reduction occurs along with a [structural] structurally simple, sturdy design of the motor. Bearing hoops for the rotor bearings, which are complicated to produce and difficult to install, are dispensed with. The rotor bearings are instead secured rigidly to the housing by their bearing sleeves and can easily be jointly injection-molded in the

process of producing the housing by injection molding. The rotor bearings, preferably embodied as slide bearings, cannot transmit tangential forces of the rotor, and they are thus decoupled from the stator. Because of the spring-elastic fastening of the stator to the housing, there is no rigid connection between the stator and the housing, which prevents the transmission of structure-borne sound from the stator to the housing.

[0008] [By the provisions recited in the further claims, advantageous refinements and improvements to the electric motor defined by claim 1 are possible.]

Page 3, paragraphs [0011] through [0015]:

[0011] [Drawing] BRIEF DESCRIPTION OF THE DRAWINGS

[0012] The invention is explained in further detail in the ensuing description[, in terms of exemplary embodiments shown in the drawing. The drawings, each schematically, show the following:] with reference to the drawings, in which:

[0013] Fig. 1[,] is a longitudinal section through an electric motor;

[0014] Fig. 2[,] is a side view of an electric motor, somewhat modified from Fig. 1, without a housing;

[0015] Fig. 3[,] is a detail of a section taken along the line III-III in Fig. 2; and

Page 4, paragraphs [0016] and [0017]:

[0016] Fig. 4[,] is a detail showing a plan view in the direction of the arrow IV in Fig. 2.

[0017] [Description of the Exemplary Embodiment] DESCRIPTION OF THE PREFERRED EMBODIMENTS

Page 5, paragraph [0020]:

[0020] The rotor bearings 14, 15 for receiving the rotor shaft 13 are fixed to the housing; the rotor bearing 14 is integrated with the bottom 23 of the housing pot 21, and the rotor bearing 15 is integrated with the housing cap 22. The housing pot 21 and housing cap 22 are for instance of plastic and for instance are injection-molded, and the rotor bearings 14, 15 are for instance jointly injection-molded simultaneously in the injection molding process. For decoupling structure-borne sound emission from the stator 11 to the housing 10, the stator 11 is suspended from the housing pot 21 spring-elastically. To that end, decoupling elements [23] 28 spaced apart from one another in the circumferential direction are secured to the inner wall 211 of the housing pot 21, and the stator 11 is retained by nonpositive and/or positive engagement on these elements. The stator 11, which comprises a pole tube 30 equipped with permanent magnet poles 29, is braced with its pole tube 30 indirectly, for instance, on the decoupling elements 28. In the exemplary embodiment of Fig. 1, four decoupling elements 28 are provided, offset from one another by 90° of an angle of rotation each, so that in the sectional view, two of these decoupling

elements 28 can be seen. The decoupling elements 28 extend for instance over the entire axial length of the pole tube 30 and protrude somewhat from the face end.

Page 6, paragraph [0022]:

[0022] As best seen from the sectional view of Fig. 3, each decoupling element 28 has a generally C-shaped profile, with one longitudinal rib 281 that is injection-molded onto the inner wall 211 of the housing pot 21 (Fig. 4), with a short leg 282 protruding at right angles from the longitudinal rib 281 toward the rotor shaft 13, and with a long leg 283 protruding at right angles from the longitudinal rib 281 toward the rotor shaft. In the long leg 283, from the inside of the leg oriented toward the short leg 282, a curved or annular- segment slot 31 is made, which extends over the full width, in the circumferential direction, of the long leg 283. This slot 31 is embodied such that the pole tube 30 can be inserted by a portion of one face end 301 into the slot 31 by positive engagement. On the free end, toward the pole tube 30, of the short leg 282, a positive-engagement element is for instance embodied, which cooperates with a positive- engagement element embodied on the outer jacket of the pole tube 30, near the other face end 302 thereof. In the exemplary embodiment of Figs. 2-4, the two positive- engagement elements are formed by the groove 33 and tongue 32 of a dovetail connection 34; the tongue 32 - as seen in Fig. 4 - is disposed on the short leg 282 of the decoupling element 28, and the groove 33 is disposed on the pole tube 30. The groove 33 of the dovetail connection 34, machined into the pole tube 30, is open toward the face end 302 of the pole tube 30, so that the tongue 32 can be pressed axially into the groove 33 on the elastic decoupling element 28.